

INTRODUCTION AND MAP 1. SLOPE OF LAND SURFACE

Quadrangle Atlas No. 23

HYDROGEOLOGY

by Edmond G. Otton

INTRODUCTION

This atlas describes the hydrology and geology of the Norrisville 7½-minute quadrangle in northern Baltimore and Harford Counties, Maryland. It is intended for use by County, State, and Federal officials as well as planners, engineers, health officials, and the general public as a guide to water supply, waste disposal, and land-use planning. The Maryland part of the quadrangle covers an area of about 43 square miles of which slightly more than one-half is in Harford County. There are no railroads within the quadrangle area and travel is facilitated chiefly by paved State and County highways. Land use is chiefly agricultural and woodland, although clusters of suburban development are near Shanes, Norrisville, and along Madonna Road in the extreme southeastern part of the quadrangle. The climate is characteristic of the humid Piedmont region of Maryland where precipitation averages about 44 inches per year. Much of the quadrangle is drained by Deer Creek, a tributary of the Susquehanna River, although the southwestern part is drained by tributaries of Gunpowder Falls. Topography is mostly undulating to hilly, except for a few flat areas near Wiley and Norrisville. Maximum relief is about 460 feet and land elevation ranges from 380 to 840 feet above sea level. Figure 1 shows the location of the quadrangle in Maryland.

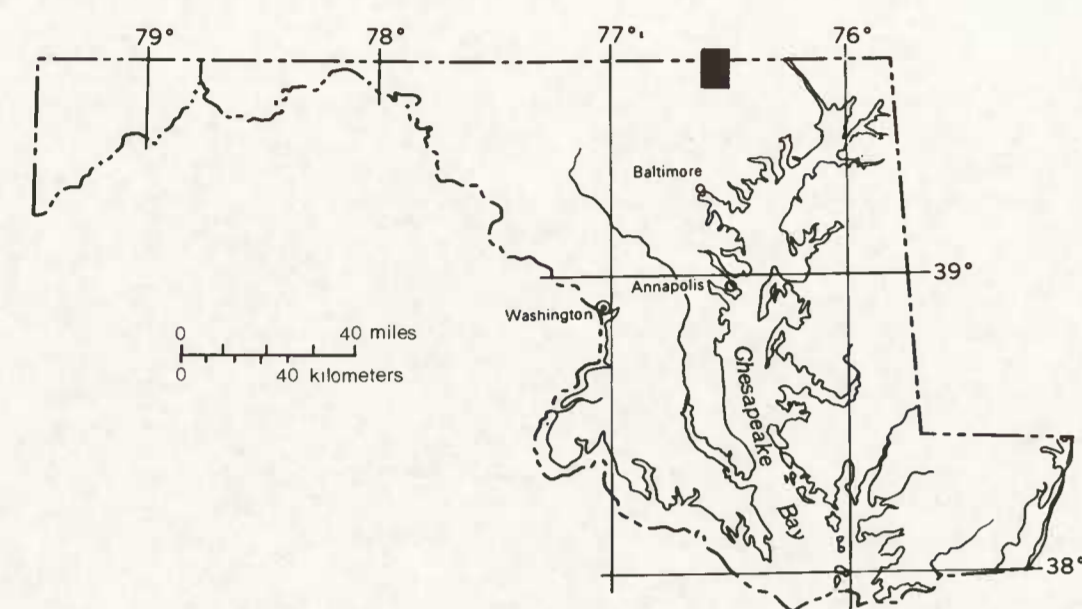


Figure 1.--Location of Norrisville quadrangle in Maryland.

HYDROLOGY

The source of ground water in the area is local precipitation, amounting to about 44 in. annually, of which 60 percent (26 in.) is returned to the atmosphere by evapotranspiration and 40 percent (18 in.) is total runoff. About 11 in. of the precipitation which enters the ground is discharged as ground-water runoff (1956, p. 48); this amounts to 25 percent of the annual precipitation and is equivalent to 325,000 gallons per day per square mile. The remaining 7 of the 18 in. of total runoff is largely overland flow.

The availability of ground water depends on the permeability and storage capacity of the fractured-rock aquifers. In many places, these rocks are sufficiently fractured and creviced such that they yield enough water to sustain domestic supplies (a few gallons a minute) to wells. In some places, the rocks are essentially impervious and yield little or no water. Some of the Piedmont rocks, such as marble or gneiss, yield more water than other rocks, such as phyllite or schist. The yield of individual wells depends also on their topographic position (valley wells are generally more productive than hilltop wells), the thickness of the weathered zone, and the extent and degree of fracturing of the rocks at the site. Most of the ground water is of suitable chemical quality for domestic use.

GEOLOGY

The Norrisville quadrangle lies within the Piedmont physiographic province. It is underlain by highly metamorphosed sedimentary rocks of early Paleozoic age, chiefly the Prettyboy Schist and the Loch Raven Schist of the Wissahickon Group. The stratigraphic nomenclature follows the usage of the Maryland Geological Survey. For more detailed information on the geology, the reader is referred to Crowley (1976); Crowley, Reinhardt, and Cleaves (1976); Southwick (1969); and Southwick and Owens (1968).

The hard crystalline rocks are mantled by soil and weathered rock (saprolite). The saprolite ranges widely in thickness and may be as great as 100 ft thick in some localities, although its average thickness is about 30 ft. Alluvium and colluvium overlie both the bedrock and the saprolite along most of the stream valleys. The thickness of these materials is highly variable, but seldom exceeds 25 ft.

MAPS INCLUDED IN ATLAS

- Map 1. Introduction and Slope of land surface, by Edmond G. Otton, and Photo Science, Inc.
- Map 2. Depth to the water table, by Edmond G. Otton.
- Map 3. Availability of ground water, by Edmond G. Otton.
- Map 4. Constraints on installation of septic systems, by Edmond G. Otton.
- Map 5. Location of wells, springs, and test holes, by John T. Hilleary and E. Mark Sadecki.

SLOPE OF LAND SURFACE

by Photo Science, Inc.

EXPLANATION

Five slope-area categories are shown on this map by four types of shading and by the absence of shading for the terrain category having a slope of 0 to 8 percent. Terrain having the maximum slope (greater than 25 percent) currently (1980) exceeds the maximum land slope permitted for the installation of domestic sewage-disposal systems (septic tanks) by the Baltimore County Health Department. As of 1980, the Harford County Health Department will not permit the installation of domestic disposal systems where the maximum land slope exceeds 20 percent. Intermediate terrain categories are useful in planning certain construction activities involving local roads and drains.

This map was prepared using topographic contour negatives by a process developed by the U.S. Geological Survey, Topographic Division. It is a semi-automated photomechanical process which translates the distance between adjacent contours into slope data. The slope zones on the map are unedited. Proximity of the same contour or absence of adjacent contours may produce false slope information at small hilltops and depressions, on cuts and fills, in saddles and drains, along shores of open water, and at the edges of the map.

LIMITATIONS OF MAPS

All the maps of this atlas represent some degree of judgment and interpretation of available data. The boundaries depicted on maps are not to be construed as being final, nor is the information shown intended to supplant a detailed site evaluation by a specialist in the fields of hydrogeology, sanitary engineering, or civil engineering.

CONVERSION FACTORS

In this atlas, figures for measurements are given in inch-pound units. The following table contains the factors for converting these units to metric (System International or SI) units:

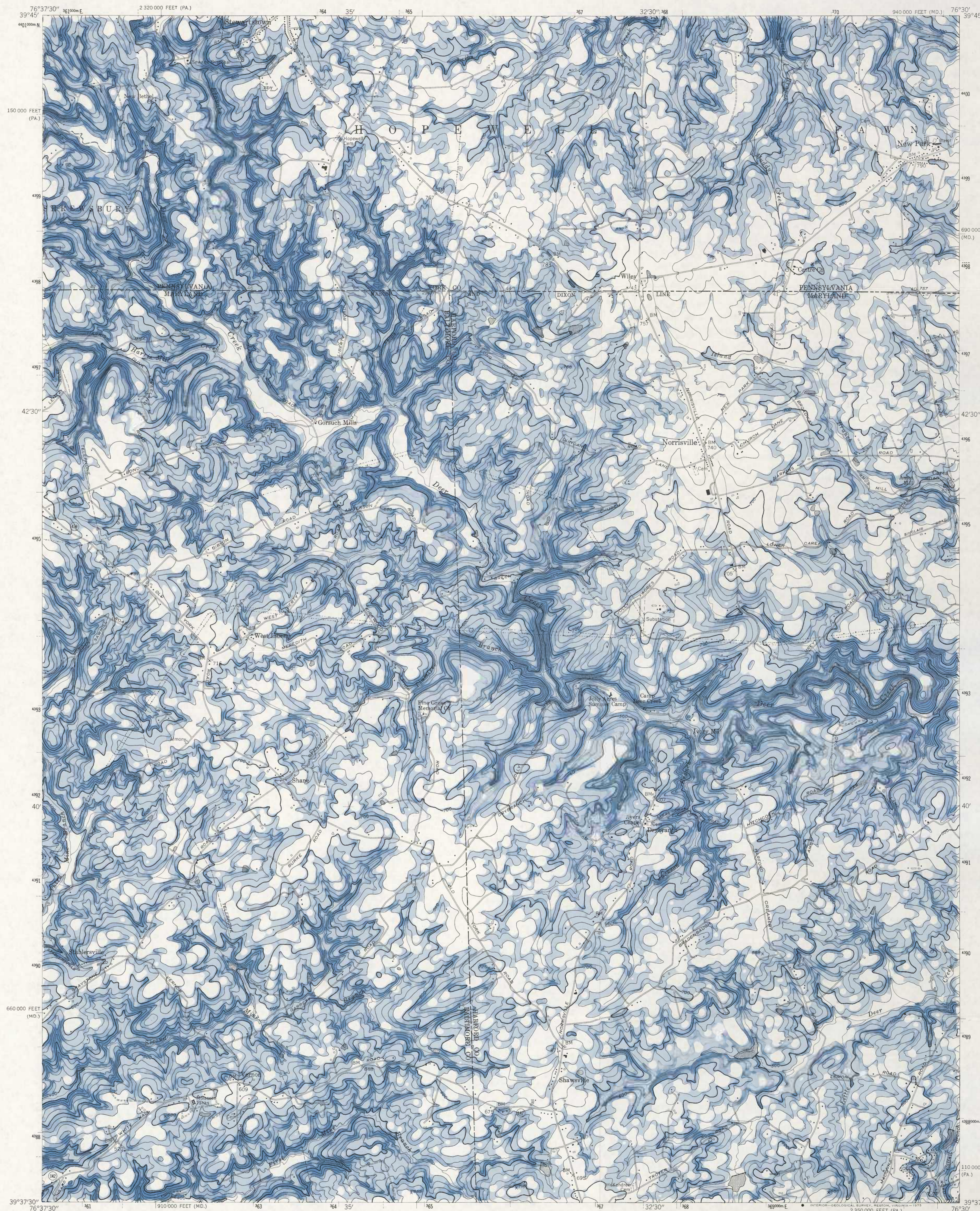
Inch-pound unit	Symbol	Multiply by	Metric unit	Symbol
inch	(in.)	25.40	millimeter	(mm)
foot	(ft)	0.3048	meter	(m)
mile	(mi)	1.609	kilometer	(km)
square mile	(mi ²)	2.590	square kilometer	(km ²)
U.S. gallon	(gal)	3.785	liter	(L)
U.S. gallon per minute	(gal/min)	0.06309	liter per second	(L/s)
U.S. gallon per minute per foot	[(gal/min)/ft]	0.2070	liter per second per meter	[(L/s)/m]

SELECTED REFERENCES

- Crowley, W. P., 1976, The geology of the crystalline rocks near Baltimore and its bearing on the evolution of the eastern Maryland Piedmont: Maryland Geological Survey Report of Investigations No. 27, 40 p.
- Crowley, W. P., Reinhardt, Juergen, and Cleaves, E. T., 1976, Geologic map of Baltimore County and City: Maryland Geological Survey, scale 1:62,500, 1 sheet.
- Dingman, R. J., Ferguson, H. P., and Martin, R. O. R., 1956, The water resources of Baltimore and Harford Counties: Maryland Department of Geology, Mines and Water Resources Bulletin 17, 233 p.
- Nutter, L. J., and Otton, E. G., 1969, Ground-water occurrence in the Maryland Piedmont: Maryland Geological Survey Report of Investigations No. 10, 56 p.
- Southwick, D. L., 1969, Crystalline rocks of Harford County, in The geology of Harford County, Maryland: Maryland Geological Survey, p. 1-76.
- Southwick, D. L., and Owens, J. P., 1968, Geologic map of Harford County: Maryland Geological Survey, scale 1:62,500, 1 sheet.

1/ The name of this agency was changed to the Maryland Geological Survey in June 1964.

Maryland Geological Survey



Base map is U.S. Geological Survey Topographic Map of the Norrisville Quadrangle (7.5 Minute Series), 1943, Photorevised 1974.

Prepared in cooperation with the United States Geological Survey and the Baltimore County Office of Planning and Zoning.

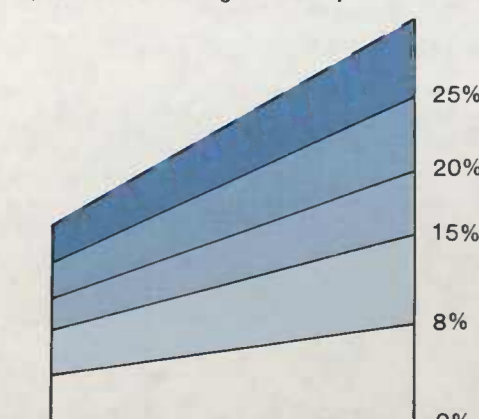
UTM GRID AND 1974 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24,000
1 MILE
1 KILOMETER
CONTOUR INTERVAL 20 FEET

1983

QUADRANGLE LOCATION

Prepared by Photo Science, Inc., Gaithersburg, Maryland. Utilizing contour negatives, furnished by United States Geological Survey.



DEPTH TO WATER TABLE

by Edmond G. Otton

EXPLANATION

This map shows the approximate depth to the top of the zone of saturation (water table) as indicated by well and spring records (Laughlin, 1966; and Nutter and Smigaj, 1975). Most of the control for areas underlain by a shallow water table (0 to 10 ft) is based on an analysis of the drainage network in the topographic quadrangle. Areas underlain by a deep water table (greater than 35 ft) were delineated chiefly on the basis of water levels reported in well records, consideration of the topographic relief, and the distribution of areas of shallow water table. In a few places, local temporary zones of perched water may occur above the main water table; such zones are not shown on the map.

The water table rises and falls in response to recharge from precipitation, and to discharge by gravity flow and by evaporation and transpiration. Ground-water levels may also fluctuate in response to pumping from wells, but in the area of this quadrangle, the hydraulic effect of pumping from domestic wells is normally limited to a few tens of feet from each well. The greatest fluctuations in the water table occur beneath hills and uplands, and the smallest occur in valleys and lowlands. Water levels in valley bottoms may fluctuate only a few feet throughout a normal year.

Commonly, in the Maryland Piedmont ground-water levels are lowest in the fall and winter and highest in the spring, but in some years low and high water levels deviate from this pattern. Long-term fluctuations also occur, related mainly to the variability of precipitation; occasionally, 2 or 3 dry years will follow one another, resulting in a period of below-average ground-water levels, or the reverse will occur and 2 or 3 wet years will occur in sequence and water levels will be above average.

The nature of the seasonal variation in the fluctuations of the water table is shown by figure 1, a plot of mean monthly water levels in well BA-CE 21 near Jacksonville, Md., approximately 7.5 mi south of this quadrangle. Well BA-CE 21 is 350 ft deep and its record consists of 204 measurements covering the period November 1956 through March 1980. Also shown is the mean monthly precipitation at Towson, Md., for the same period. The graph shows that the highest water levels generally occur in March, April, and May, and the lowest in January and February, with a secondary low period occurring in October. Although precipitation is relatively high during August and September, it contributes relatively little recharge to the aquifers because of the high rates of evaporation and transpiration prevailing during these summer months. By November and December, plant life enters a dormant phase, air temperatures drop, and precipitation again becomes effective in recharging the aquifers, as shown by the rising water levels during these months.

The magnitude and range of water-level fluctuations in observation well HA-CA 23 are shown in figure 2. This figure shows the percentage of time the water level is above a given stage, based on 57 monthly measurements. This well, located about 6.5 mi south of the Norrisville quadrangle, penetrates the Loch Raven Schist to a depth of 200 ft, and the measurements cover the period from November 1974 through March 1980. The median water level in the well was 6.35 ft below land surface and during 60 percent of the time, the water level was in the range of 5.5 to 7.3 ft. During the entire period of record, the water level only fluctuated within a range of 4.0 ft. The graph indicates possible water-level fluctuations that might occur under similar geohydrologic conditions in the Norrisville quadrangle. Well HA-CA 23 is on the side of a small swale or ravine near Gunpowder Falls.

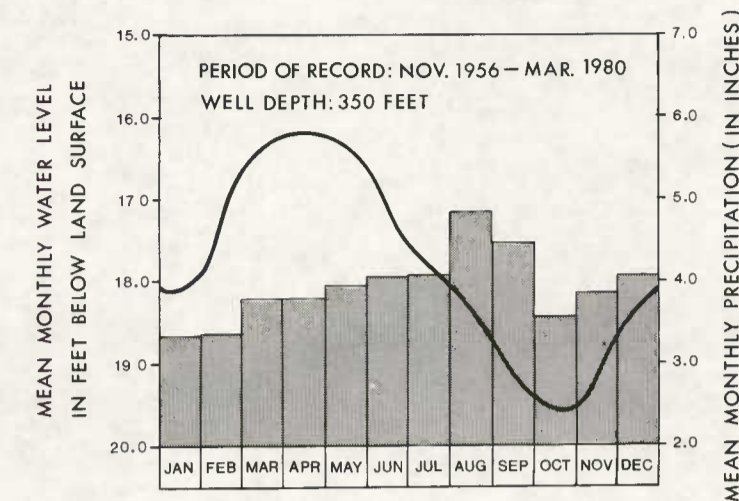


Figure 1.--Mean monthly water level in observation well BA-CE 21 and mean monthly precipitation.

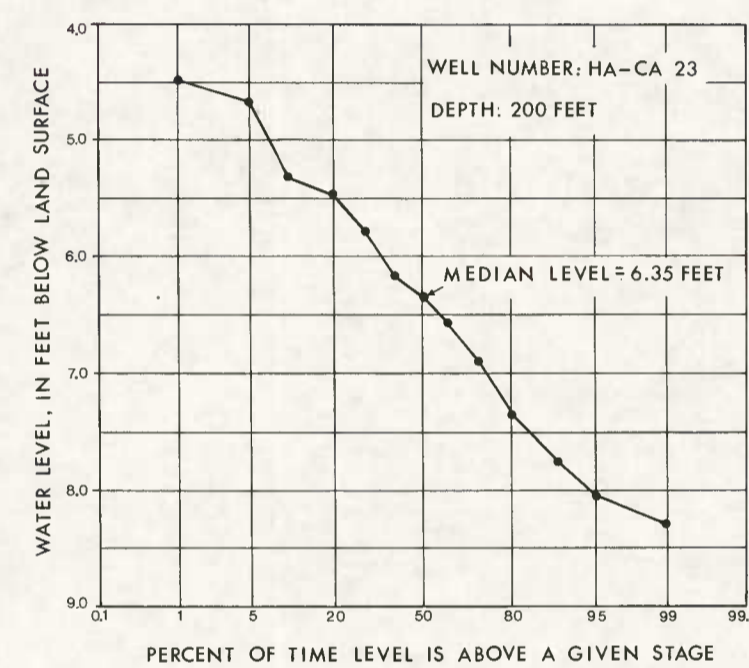
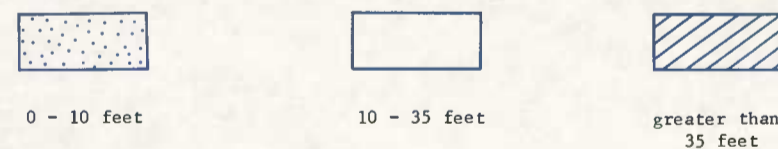


Figure 2.--Stage-duration graph of the water level in well HA-CA 23 near Hess in Gunpowder State Park.

SELECTED REFERENCES

- Dingman, R. J., and Ferguson, H. F., 1956, The ground-water resources of the Piedmont part, in The water resources of Baltimore and Harford Counties: Maryland Department of Geology, Mines and Water Resources Bulletin 17, 128 p.
- Laughlin, C. P., 1966, Records of wells and springs in Baltimore County, Maryland: Maryland Geological Survey Water Resources Basic Data Report No. 1, 403 p.
- Nutter, L. J., 1977, Jarrettsville quadrangle hydrogeology: Maryland Geological Survey Quadrangle Atlas No. 5 (4 maps and text).
- Nutter, L. J., and Smigaj, M. J., 1975, Harford County ground-water information: Well records, chemical quality data, and pumpage: Maryland Geological Survey Water Resources Basic Data Report No. 7, 89 p.

APPROXIMATE DEPTH TO WATER
IN FEET BELOW LAND

Prepared in cooperation with the United States Geological Survey and the Baltimore County Office of Planning and Zoning.

AVAILABILITY OF GROUND WATER

by Edmond G. Otton

NATURE OF OCCURRENCE

Ground water in the Piedmont part of Baltimore and Harford Counties occurs chiefly in the fractures and other voids in crystalline rocks, but some ground water is also present in the residuum (decomposed rock) or saprolite which forms a mantle of variable thickness over most of the bedrock. The source of almost all the water in the rocks is local precipitation amounting to about 44 in. per year.

Downward-moving water fills the voids and fractures in the rocks and their residuum forming a zone of saturation at variable depths beneath the land surface. The upper surface of the zone of saturation is the water table, or potentiometric surface. This irregular surface fluctuates with time in response to changes in the rate of replenishment of the saturated zone and to changes in the rate of removal of water from the zone. Ground water is discharged from the saturated zone by gravity flow to nearby streams, by pumping from wells, and by evapotranspiration where the root zone of vegetation is sufficiently close to the saturated zone. Ground water is added to the zone chiefly from infiltrating local precipitation.

Where the rocks in the saturated zone are capable of yielding water to wells and springs, they are termed "aquifers." Aquifers differ widely in their ability to yield water. In the Piedmont region, some rocks appear to be better aquifers than others, depending in part on the nature and extent of their interconnected fractures and voids. Figure 1 is a generalized sketch showing ground-water occurrence and movement in the Piedmont region.

The yields of individual wells in the Norrisville quadrangle depend on factors such as topographic position of the well, nature and thickness of the saprolite, and extent and degree of fracturing of the rocks at the well site. In general, the number of fractures and voids in the rocks decrease with increasing depth and may be found only infrequently below depths of 250 to 300 ft.

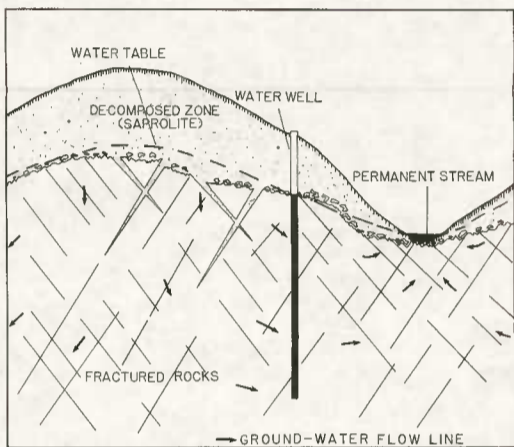


Figure 1.—Occurrence and movement of ground water in Piedmont terrain.

Unfractured and unweathered metamorphic crystalline rocks are essentially impermeable. Rocks containing several intersecting fractures are more permeable and accordingly are more likely to yield larger supplies of water to wells. Therefore, the distribution of fractures is a major factor governing the availability of water in these rocks. An analysis of topography on maps and aerial photographs shows linear features which may identify major zones of rock fracturing. The orientation of many valleys and stream channels seems to be controlled by the zones of rock fracturing. Wells drilled in such zones may be expected to have above-average yields. The presumed existence of such fracture zones, or lineaments, is shown on the accompanying map by the straight lines following the trend of numerous water courses.

EXPLANATION

The rocks of the Norrisville quadrangle consist chiefly of two formations, the Prettyboy Schist and the Loch Raven Schist (Crowley and others, 1976). Analysis of the yields and specific capacities of 109 wells in both geologic units in the quadrangle indicated no significant difference in their water-yielding characteristics. Differences between various geologic units have been observed in other quadrangles to the west and south of the Norrisville quadrangle, especially in areas underlain extensively by marble, gabbro, or phyllite. Differences in the median or mean specific capacity of wells is the major basis for designating numbered geohydrologic units, with the most productive units designated by lower numbers.

GEOHYDROLOGIC UNIT 1: Area underlain by Coastal Plain sediments; does not occur in the Norrisville quadrangle, but is present east of the Fall Line about 17 mi to the southeast.

GEOHYDROLOGIC UNIT 2: Includes the entire quadrangle and comprises the Prettyboy Schist and the Loch Raven Schist (of the Wissahickon Group). The Prettyboy Schist occupies the northern two-thirds of the quadrangle and the Loch Raven Schist, the southern one-third. The Prettyboy is a uniform, fine-grained, plagioclase-chlorite-muscovite quartz schist, commonly containing magnetite and conspicuous albite porphyroblasts. The Loch Raven Schist is a medium to coarse-grained biotite-plagioclase quartz schist with lenticles and pods of vein quartz; it contains several metamorphic facies (Crowley and others, 1976) and the garnet facies is present throughout most of the Norrisville quadrangle.

WELL YIELDS AND DEPTHS: The reported yields ^{1/} of 109 wells in unit 2, chiefly 6-inch-diameter domestic wells, range from 1 to 60 gal/min, and the mean yield is 10 gal/min; the median yield is 8 gal/min. Figure 2 shows the distribution of wells by yield classes and adequacy categories. Only one well is reported to yield less than 2 gal/min.

The depths of 120 wells range from 30 to 409 ft and the median depth is 100 ft.

WELL SPECIFIC CAPACITIES: Reported specific capacities ^{2/} of 109 wells range from 0.01 to 4.0 (gal/min)/ft and the median value is 0.24 (gal/min)/ft. Based on its specific capacity, the most potentially productive well is HA-BA 77, located in the extreme southeast corner of the quadrangle. This well reportedly yielded 20 gal/min with a drawdown of only 5 ft at the end of 2 hours of pumping.

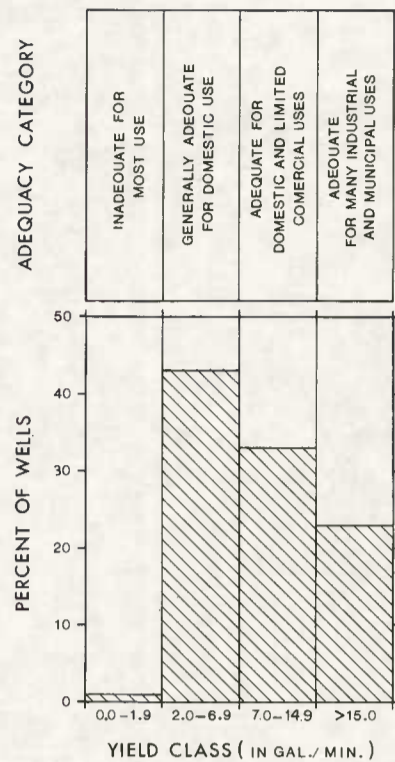


Figure 2.—Yield class graph for Geohydrologic Unit 2.

Linear features are natural alignments visible on aerial photographs. They include topographic depressions and ridge crests, straight drainage segments and straight, narrow bands of light or dark tone which may indicate anomalous vegetation or soil-moisture alignments. Linear features could reflect planes of bedding or foliation, rock boundaries or prominent lithologic horizons, faults or joints.

REFERENCES

- Crowley, W. P., Reinhardt, Juergen, and Cleaves, E. T., 1976, Geologic map of Baltimore County and City: Maryland Geological Survey, scale 1:62,500, 1 sheet.
- Dingman, R. J., and Ferguson, H. F., 1956, The ground-water resources, in The water resources of Baltimore and Harford Counties: Maryland Department of Geology, Mines and Water Resources Bulletin 17, p. 1-128.
- Laughlin, C. P., 1966, Records of wells and springs in Baltimore County, Maryland: Maryland Geological Survey Water Resources Basic Data Report 1, 403 p.
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- Nutter, L. J., and Smigaj, M. J., 1975, Harford County ground-water information: Well records, chemical-quality data, and pumpage: Maryland Geological Survey Basic Data Report No. 7, 89 p.
- Southwick, D. L., and Owens, J. P., 1968, Geologic map of Harford County: Maryland Geological Survey, scale 1:62,500, 1 sheet.

^{1/} Only wells for which the driller reported a yield test of 2 hours duration, or longer, were used in this analysis.

^{2/} Specific capacity of a well is the yield per foot of drawdown of the water level in the well. No time period is specified for the measurement of this variable, which is commonly expressed in gallons per minute per foot of drawdown (gal/min)/ft. For many domestic wells, the period of measurement ranges from 2 to 6 hours. Analyses include only wells tested for 2 hours or longer.



Prepared in cooperation with the United States Geological Survey and the Baltimore County Office of Planning and Zoning.

MAP 4. GEOHYDROLOGIC CONSTRAINTS ON SEPTIC SYSTEMS

Quadrangle Atlas No. 23

CONSTRAINTS ON INSTALLATION OF SEPTIC SYSTEM

by Edmond C. Otton

FACTORS CONSIDERED, AND
THEIR SOURCE OF EVALUATION

The units shown on this map differ in their suitability for domestic liquid-waste disposal systems because of differences in soil and subsoil infiltration characteristics, land slope, depth to water table, flood hazard, and the existence at various places of a thin or rocky soil mantle over bedrock. These elements are discussed below:

1. **Flood hazard:** Most valleys in the Norrisville quadrangle are subject to periodic flooding. Floods would cause uncontrollable dispersal of sewage and possible physical damage to the disposal system.
2. **Shallow water table:** The 10-ft depth to the water table used as a constraint in this report is the sum of three component factors. These are: (a) The recommended depth of drain tile fields is 3 ft below the land surface (U.S. Department of Agriculture, Soil Conservation Service, 1971, p. 3); (b) a minimum depth of 4 ft between the base of the tile field (absorption trench) and the underlying water table is recommended (U.S. Public Health Service, 1967, p. 11); and (c) a 3-ft additional depth is suggested to allow for seasonal variations in position of the water table, which commonly fluctuates through at least a 3-ft range in Piedmont valleys.
3. **Depth to bedrock:** Where bedrock crops out or occurs near the land surface, the construction of underground disposal systems is not feasible. Hence, the presence of rock is an obvious geologic constraint.
4. **Slope:** Steep slopes are considered to be a major contributing cause of the failure of underground sewage disposal systems (U.S. Public Health Service, 1967, p. 18; and U.S. Department of Agriculture, Soil Conservation Service, 1971, p. 8). Land slopes in excess of 25 percent were obtained from a machine-generated slope map prepared by the U.S. Geological Survey. Maryland Department of Health regulations (July 1964, Section 1, definitions, part 1.9) do not permit, as of 1979, the installation of underground domestic sewage disposal systems where the slope of the land is in excess of 25 percent. Harford County limits the installation of such systems to a slope not in excess of 20 percent.
5. **Infiltration rate:** This factor affects the design of the disposal system. If infiltration into the soil is too slow, drainage will be sluggish and effluent may back up into the septic tank and to the household plumbing. If too fast, renovation of the liquid effluent may be inadequate and the ground water may be subject to pollution. In Maryland, infiltration rates are evaluated at the proposed disposal site by means of percolation tests.

These five factors are evaluated and synthesized in order to generate three units on the accompanying map. Thus, the terrain is classified according to its constraint or limitation for the installation of domestic underground sewage disposal systems. In the map preparation, considerable use was made of the soil surveys of Baltimore and Harford Counties (Reybold and Matthews, 1976, and Smith and Matthews, 1975).

SELECTION OF UNITS



UNIT I (Maximum constraints): Disposal systems constructed in this unit face a high probability of failure. The unit includes low-lying valley-bottom areas where the depth to the water table ranges from 0 to 10 ft and other areas where the slope of the land surface exceeds 25 percent. Unit I is underlain by stream alluvium, colluvium, and rocky land, or land underlain by a thin veneer of stony soil. Many of the valley bottoms are subject to periodic flooding.

Relatively few percolation tests have been made in Unit I, but the soil and subsoil along the valley floors appear to be relatively impermeable. Common soil types in the valleys are Hathboro, Codorus, and Baile (U.S. Department of Agriculture, 1975 and 1976). Common soils along the steep hillsides are Mt. Airy, Manor, and Clenelg.



UNIT II (Marginal to variable constraints): Disposal systems constructed in this unit face less severe constraints and the constraints are somewhat variable from place to place within the unit. However, in some places a combination of land slopes of nearly 25 percent and thin, stony soils, or the presence of bare rock may impose restrictions as severe as in Unit I. Generally, in this unit the depth to the water table is greater than 10 ft and the land slope ranges from 15 to 25 percent. Harford County health regulations (as of 1979) will not permit underground disposal systems where the land slope exceeds 20 percent.

The designation of Unit II was based largely on the distribution of the following soils in the quadrangle (Reybold and Matthews, 1976; and Smith and Matthews, 1975): Clenelg loam (Cd2 and Cd3); Glenville silt loam (GnA), Legore silt loam (Ld2); Manor loam and Manor channery loam (MbD3, MbD2, and MbD3); Mt. Airy channery loam (Md2 and Md3); and Watchung silt loam (WaA and WaB). In evaluating soils for their limitations for underground disposal systems, considerable use was made of table 7 entitled "Limitations of soils for town and country planning" (Reybold and Matthews, 1976, p. 120-129).



UNIT III (Minimum constraints): Geohydrologic conditions in this unit are the most favorable for the installation of domestic sewage disposal systems. Slopes of the land surface are generally less than 15 percent, and the unit commonly occupies well-drained, interfluvial areas underlain by Chester, Manor, and Clenelg soils. Depth to the permanent water table is nearly everywhere greater than 10 ft, and in many places more than 35 ft. Locally, the depth of weathered rock (saprolite) may be more than 30 to 35 ft.

Percolation tests have a high success rate in Unit III, especially those conducted at depths greater than 5 to 6 ft. However, the possibility of pollution of the underlying fractured rock aquifers still exists where deep disposal pits end in subsoils having very rapid percolation rates.

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- Crowley, W. P., Reinhardt, Juergen, and Cleaves, E. T., 1967, Geologic map of Baltimore County and City: Maryland Geological Survey, scale 1:62,500, 1 sheet.
- Reybold, W. U., and Matthews, E. D., 1976, Soil survey of Baltimore County, Maryland: U.S. Department of Agriculture, Soil Conservation Service, 149 p.
- Smith, Horace, and Matthews, E. D., 1975, Soil Survey of Harford County, Maryland: U.S. Department of Agriculture, Soil Conservation Service, 118 p.
- Southwick, D. L., and Owens, J. P., 1968, Geologic map of Harford County: Maryland Geological Survey map CCH-1, scale 1:62,500, 1 sheet.
- U.S. Department of Agriculture, Soil Conservation Service, 1971, Soils and septic tanks: 12 p.
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- Wright, F. B., 1977, Rural water supply and sanitation (3rd ed.): Huntington, N.Y., Robert E. Krieger Publishing Company, 305 p.



Prepared in cooperation with the United States Geological Survey and the Baltimore County Office of Planning and Zoning.

MAP 5. LOCATIONS OF WELLS AND SPRINGS

Maryland Geological Survey

Quadrangle Atlas No. 23

LOCATION OF WELLS AND SPRINGS

by E. M. Sadecki and J. T. Hilleary

EXPLANATION

Information for wells and springs shown on the map is contained in a publication by Laughlin (1966) and in a later publication by Nutter and Smigaj (1975). Data compiled for wells subsequent to these publications are on file at the U.S. Geological Survey office, Towson, Md., and at the Maryland Geological Survey, Baltimore, Md. Drillers' logs and well-construction records are available for most of the wells shown.

Well-numbering system: The wells and springs located on the map are numbered according to a coordinate system in which Maryland counties are divided into 5-minute quadrangles of latitude and longitude. The first letter of the well number designates a 5-minute segment of latitude; the second letter designates a 5-minute segment of longitude. These letter designations are followed by a number assigned to wells sequentially. This letter-number sequence is the quadrangle designation, which is preceded by an abbreviation of the county name. Thus, well BA-BA 7 is the seventh well inventoried in quadrangle BA in Baltimore County. In reports describing wells in only one county, the county prefix letters are frequently omitted from the well number. However, the numbering system currently in use (1980) differs slightly from that used in earlier published reports, such as Dingman and Ferguson (1956). In this latter report, well BA-BA 7 was designated as Bal-Ba 7. The discontinuance of the use of lowercase letters was necessitated by the change in 1970 to a computer storage and retrieval system for well information.

Water wells drilled in Maryland since 1945 also have a number (not shown on this map) assigned by the Maryland Water Resources Administration. This number consists of a two-letter county prefix (for example, BA for Baltimore County and HA for Harford County) followed by a two-digit number indicating the State fiscal year in which the permit was issued (for example, -72 for the 1972 fiscal year). A four-digit sequential number follows the fiscal year designation. Thus, well BA-72-0010 is the 10th well permit issued for Baltimore County during the 1972 fiscal year. After fiscal year 1972, all permit wells have been identified with the year code -73- because of the use of pre-stamped metal tags required to be affixed to the well.

26
○
WELL AND NUMBER
16
○
SPRING AND NUMBER

REFERENCES

- Dingman, R. J., and Ferguson, H. F., 1956, The ground-water resources of the Piedmont part, in The water resources of Baltimore and Harford Counties: Maryland Department of Geology, Mines and Water Resources Bulletin 17, 128 p.
- Laughlin, C. P., 1966, Records of wells and springs in Baltimore County, Maryland: Maryland Geological Survey Water Resources Basic Data Report No. 1, 403 p.
- Nutter, L. J., and Smigaj, M. J., 1975, Harford County ground-water information: Well records, chemical-quality data, and pumpage: Maryland Geological Survey Water Resources Basic Data Report No. 7, 89 p.

